

NOTES ON *TETRACLADIUM APIENSE* SINCLAIR AND EICKER

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SUMMARY. — Single conidia isolates and field material of *Tetracladium apiense* Sinclair et Eicker from Spain is compared with holotype. An emendment of the original diagnosis is provided. The world wide distribution of this fungus is discussed.

RÉSUMÉ. — L'hotype de *Tetracladium apiense* Sinclair et Eicker est comparé avec plusieurs isolements et échantillons d'Espagne. La description originale est amendée. La distribution mondiale de ce champignon est également discutée.

RESUMEN. — Se compara el holotipo de *Tetracladium apiense* Sinclair et Eicker con varios aislamientos y material de campo procedentes de España. Se realiza una enmienda a la descripción original. La distribución mundial de este hongo es comentada.

KEY WORDS : *Tetracladium apiense*, aquatic hyphomycete, systematic.

SINCLAIR & EICKER (1981) described *Tetracladium apiense* from pure cultures derived from conidia on unidentified leaves in Transvaal (S. Africa). Their holotype (IMI 250776) provides very sparse information on conidiogenesis. It does contain numerous conidia, but many are misshapen (see our Fig. 2) (this is a common problem with «aquatic hyphomycetes», where laboratory sporulation is induced mostly under far from ideal conditions). The authors only selected for their illustrations what we believe are the most typical conidial structures (with 6 apices), but other should also represent the species. The three-dimensional branching is only somewhat evident in the SEM of Fig. 1 A.

Furthermore, the protologue does not seem to always match the characters evident from examination of the material, or it makes use of some terminology which we believe needs clarification. For example it states that conidiophores are micronematous and erect, ■ contradiction according to ELLIS (1971) definitions. Conidiogenous cells are said to be monoblastic and conidia thus solitary, when conidiogenous cell polyblasty is an outstanding generic character. In describing the structure of detached conidia it is not clear what is meant by

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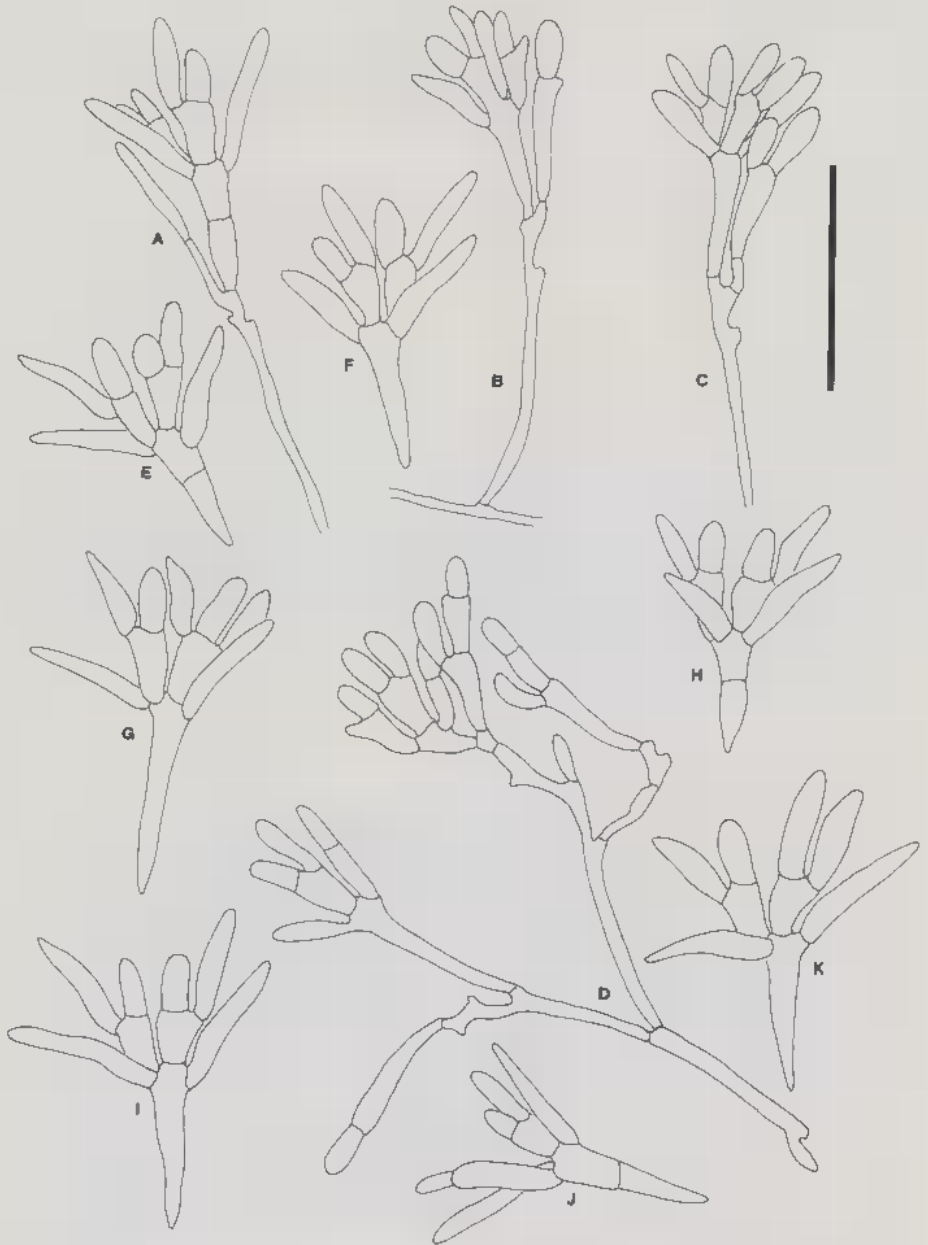


Fig. 1. — *Tetraccladium apiense* from pure culture (MUB : AR 9700). A to D : Conidio-phores; E to K : detached conidia; bar = 25 μ m.

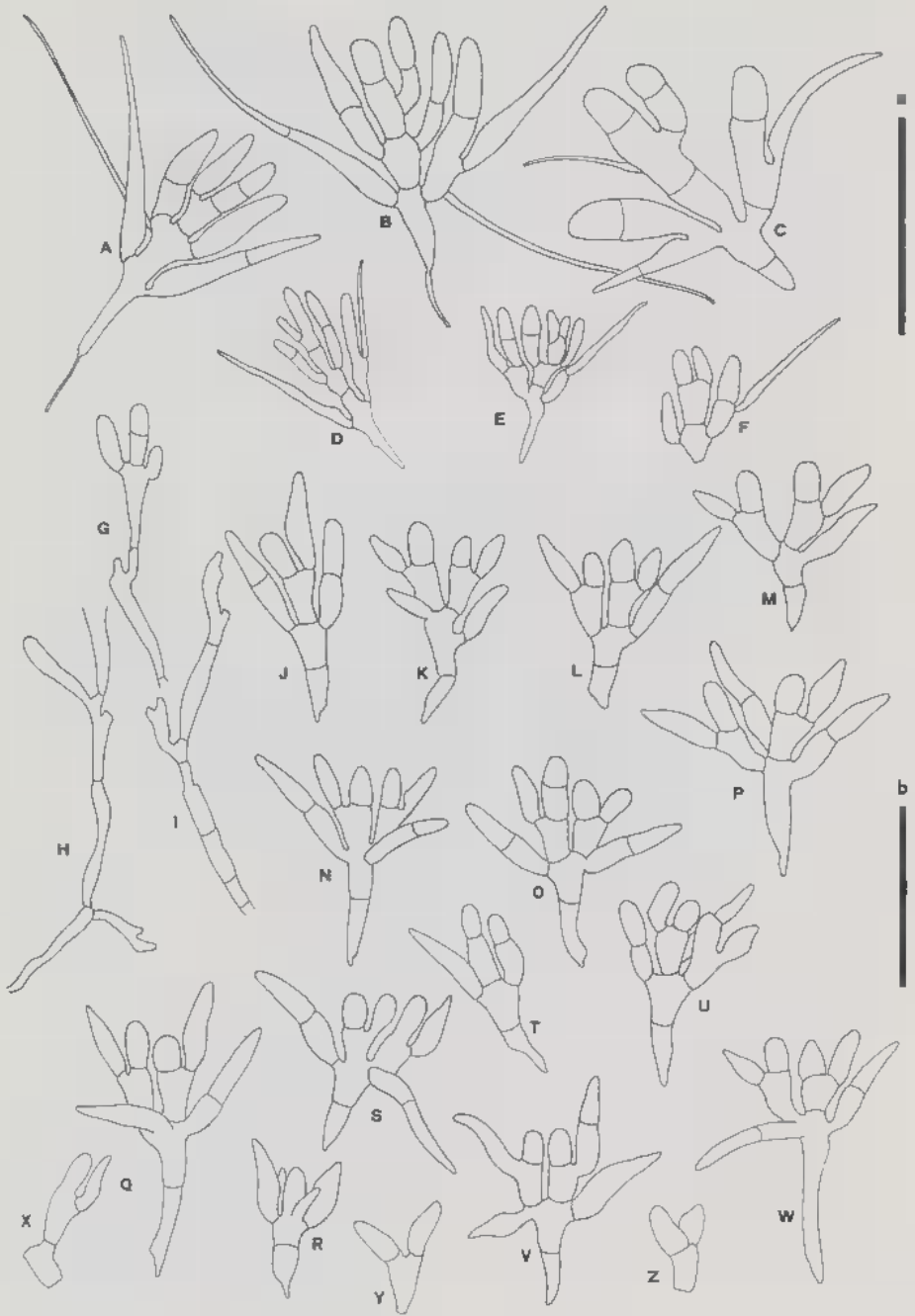
Fig. 1. — *Tetraccladium apiense* en culture pure (MUB : AR 9700). A à D : conidiophores; E à K : conidies; échelle : 25 μ m.

«central» and «proximal» arms, nor, in the Latin diagnosis, why is conidial structure limited to only «conidia triradiata vel quadriradiata». Finally, the brief discussion states that «the central digitate processes are nearly always dichotomously branched». But a dichotomy is by definition a type of apical branching where both arms of the fork appear at the same time and retain their apical dominance. This is the case in *Dwayaangam*, *Triposporina*, etc... but not *Tetracladium*, where the arms characteristically arise laterally from below a septum.

We have reisolated *T. apiense* in the course of surveys of «aquatic hyphomycetes» from mainland Spain and the Balearic Islands. After comparing our material with the holotype we believe that there is reason for reporting and illustrating further characters of the fungus, based on our isolates and field material. We also incorporate some interesting features from the holotype (Fig. 2), and we draw the readers' attention to some less easily accessible literature, such as PRICE (1964) where the fungus was first studied in pure culture.

Tetracladium apiense Sinclair et Eicker 1981, *Trans. Brit. Mycol. Soc.* 76 (3): 515-517 (Fig. 1, 3).

Colony (2 % MEA) white to beige, reaching 3.5 cm diam./3 weeks at room temperature, fluctuating 16-20°. Aerial mycelium absent or scanty, limited to the centre and white. Submerged hyphae hyaline, 1-3 µm wide. **Sporulation** sparse on undisturbed colonies on agar, but slices of the culture submerged in sterile distilled water in Petri dishes (at room temperature) for 7-14 days yielded numerous conidia. **Conidiogenous structures** hyaline and thin-walled. **Conidiophores** micronematous or more often semimacronematous and then mononeematous, septate, simple or very sparsely branched, up to 120 (-150) x 1.5-3 µm. **Conidiogenous cells** integrated with both the conidiophore and the first conidium, apical, lateral or intercalary, polyblastic sympodial secession, scars denticulate. **Conidia** acropleurogenous, branching sequentially and laterally from two levels, in more than one plane and immediately below septa. Mature detached conidia multiseptate, with 2-7 rounded to acute (but never acicular) apices (typically 6), spanning 25-40 µm, the lower element clavate, (0)-medially septate, a short caudal extension often present; the upper elements all delimited by septa, are typically arranged as follows: 4 elements form a verticil, two of them more or less widely divergent slightly curved outwards, long-fusoid to subulate, and (0)-medially septate; the other two elements, which tends to be more central (one of which often is in line with the lower element), are mostly straight digitiform and medially septate, each bearing at the same level, shorter, cupulate, digitiform, subulate or phialiform, lateral, inserted immediately below the median septum. (these two pairs of processes strikingly resemble conidia of *Tricellula aquatica*). Sometimes a third lateral may appear on either central element, at a higher level. Conidia secede schizolytically. The holotype contains part-conidia, apparently as a result of fragmentation at one or more septa. Conidia germinate readily in liquefied foam and on isolation media (DESCALS & al., 1977).



Collections examined : monospore isolate from stream foam, Los Chorros del Río Mundo, Albacete (UTM WH 4957) Roldán and Descals, 19 Dec. 1985 (MUB : AR 9700); monospore isolate from incubated leaves of *Populus nigra* from Río Vinalopó, Alicante (UTM YH 8806) Roldán and Honrubia, Dec. 1986 (MUB : AR 9701); on boiled grass blades incubated in pond water at room temperature (ca. 20°C) for two weeks, Esporles, Mallorca (Balearic Islands), Descals, May 1987 (Descals E 7); conidia in foam, Torrent Sant Pere, from stream through mixed wood and *Platanus* plantation, *loc. cit.*, Descals, 5 June 1987; IMI 250776 (holotype).

With regard to distribution and substrate preferences of *T. apiense*, it is becoming obvious that the fungus is widespread in warm temperate regions of the world : COWLING (1963) drew conidia from foam and leaves in Eastern Australia, although he saw them as abnormal *Tetracladium marchalianum* and *T. setigerum* (his Fig. 7). Interestingly enough, he included in Fig. 1 J an unknown propagule from nature which greatly resembles part-conidia seen from pure culture in the holotype slide, probably as a result of fragmentation after release. PRICE (1964) described in great detail the conidiogenesis of *T. apiense*, isolates obtained from foam and *Salix* leaves submerged in streams in South Australia. She unfortunately did not name her fungus although she was aware of its novelty. SINCLAIR & EICKER (1981) formally described the fungus from S. Africa, and referred to drawings by INGOLD (1960) of conidia in stream foam in Rhodesia (now Zimbabwe) which he recognized as an undescribed species. They also quote FERREIRA & al. (1981), who erroneously recorded conidia as *T. setigerum* from the type locality (the River Apies). MATSUSHIMA (1981, Fig. 119) isolated a conidium from stream scum in Alabama in July 1979, which he assigned to *T. setigerum* although several conidia are indistinguishable from those of *T. apiense*. Nevertheless, the presence on other conidia of acicular branches, never present in our pure cultures of *T. apiense*, seems to be diagnostic of *T. setigerum*. It is possible that in some cases one or more branches do not have the opportunity to develop fully into a pointed end, and remain blunt, knoblike or digitiform. This phenomenon and its reverse, i. e. : what should remain as short processes extend into much elongated branches, occur frequently in *Tetracladium* spp. If we add to this the capacity for polar germination from

Fig. 2. — A, B, C, F : *Tetracladium* sp., conidia from stream foam in Enol Lake (Asturias) Roldán (A-87). D, E : *Tetracladium* sp., conidia from stream foam in La Molina (Spanish Pyrénées) Roldán (A-92). G to Z : *Tetracladium apiense* from holotypus (IMI 250776); G to I : conidiophores; J to W : detached conidia; X to Z : part conidia. (A to F, scale «a» = 20 µm; G to Z, scale «b» = 20 µm).

Fig. 2 — A, B, C, F : *Tetracladium* sp., conidies provenant du Lac Enol (Asturies) Roldán (A-87). D, E : *Tetracladium* sp., conidies de La Molina (Pyrénées espagnoles) Roldán (A-92). G à Z : *Tetracladium apiense* de l'holotype (IMI 250776); G à I : conidiophores; J à W : conidies; X à Z : portions de conidies. (A à F, échelle «a» = 20 µm; G à Z, échelle «b» = 20 µm).

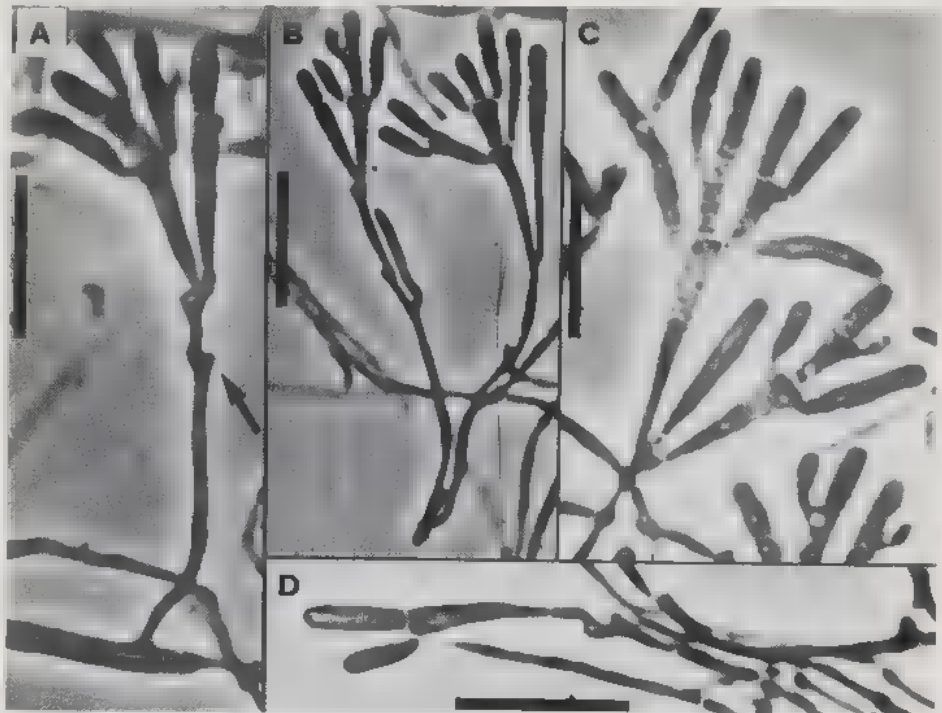


Fig. 3. — Conidiophores of *Tetracodium apiense* in pure culture (MUB : AR 9700). Arrow shows sympodial elongations in A. (Water mounts), bar = 20 μ m.

Fig. 3. — Conidiophores de *Tetracodium apiense* en culture pure (MUB : AR 9700). La flèche montre l'élongation sympodiale en A. Échelle = 20 μ m.

any of these conidial apices, the identification of single detached conidia in foam or water becomes even more unreliable.

In Spain, *T. apiense* has been recorded by ROLDAN & al. (a, b, *in press*) from various localities in the Southern mountain ranges. Conidia have also been seen developing on *Robinia* and *Salix* leaves from acid waters (ROLDAN & al., 1987, Table II) and in Alicante and Mallorca (Balearic Islands) in alkaline ponds and streams. The fungus is obviously associated with decomposition of allochthonous leaves in various freshwater habitats, and its distribution is bound to be much wider than we presently know.

There appear to be undescribed forms close to *T. apiense*, as seen in DESCALS (*in press*) (mislabelled as *T. apiense*) and in Fig. 2 A-F, drawn from conidia in Asturias and Spanish Pyrénées, North Spain.

The species delimitations in *Tetracodium* will remain unstable until many more isolates are carefully studied. This is especially true for the continuum *T. apiense* - *T. setigerum* and *T. furcatum* - *T. maxilliforme*, but there are now

also doubts about the identity of many forms traditionally assigned to *T. marchalianum* (GÖNCZÖL, *in litt.*, and our observations).

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